Shri Vile Parle Kelavani Mandal's
DWARKADAS J. SANGHVI COLLEGE OF ENGINEERING
(Autonomous College Affiliated to the University of Mumbai)
NAAC Accredited with "A" Grade (CGPA : 3.18)

Academic Year (2022-23)
Year: 3 Semester: V

Program: B.Tech Mechanical Engineering **Max. Marks: 75**
Subject: Introduction to Robotics (DJ19MEHN2C1) **Time: 10.30AM to 1.30PM**
Date: 03/01/2023 **Duration: 3 Hours**

REGULAR EXAMINATION

Instructions: Candidates should read carefully the instructions printed on the question paper and on the cover page of the Answer Book, which is provided for their use.
(1) This question paper contains two pages.
(2) All Questions are Compulsory.
(3) All questions carry equal marks.
(4) Answer to each new question is to be started on a fresh page.
(5) Figures in the brackets on the right indicate full marks.
(6) Assume suitable data wherever required, but justify it.
(7) Draw the neat labelled diagrams, wherever necessary.
(8) Each question is set from one module, Q1, 2, 3, 4 is related to module/unit 1, 2, 3 & 4.
(9) Q5 is related to module/unit 5 & 6.

Question No.		Max. Marks
Q1 (a)	What is a robotic manipulator ? Draw a neat sketch & explain its parts.	5
(b)	Explain the specification of robots, viz., load carrying capacity & speed with diagrams.	4
(c)	What is tool orientation ? How do you define the 3 possible orientations of the tool, viz., Yaw, Pitch & the Roll with a good sketch.	6
	OR	
(a)	What is the need for robots in the modern day automated world, explain some points to illustrate this.	3
(b)	What is degree of freedom (DOF) & axis, define those 2 terms & explain them with sketches.	4
(c)	Explain the classification of robots in brief with sketches.	8
Q2 (a)	Explain what is a drive, what are pneumatic actuators & drives, explain with diagrams.	5
(b)	What is point to point motion in robotics, explain with a neat diagram.	5
(c)	What are hydraulic drives & electric drives, which one is more powerful drive, why ?	5
	OR	
(a)	Explain the PNP or the Pick & Place motion with diagrams & applications	5

(b)	Explain the straight line motion in robotics for a robot to move from point A to B by a robot.	5
(c)	List out the types of robot electric motors along with the block diagram of an electric drive.	5
Q3 (a)	Define a sensor and explain position, velocity & acceleration sensors with examples.	6
(b)	Explain potmeters, force torque & incremental encoders.	4
(c)	What is robotic vision system with the help of a camera, explain it with a neat diagram.	5
	OR	
(a)	Write a note on some of the illumination techniques that could be used in robots for lighting a scene using a camera.	5
(b)	What are the applications of robotic or computer vision for robo systems ?	5
(c)	Write a note on proximity & infra-red sensors with good diagrammatic approaches.	5
Q4 (a)	What are power transmission systems, explain the gears, pulleys, chains with diagrams.	6
(b)	Differentiate between belts & chains with diagrams.	5
(c)	List out the factors that could be used in gripper design & selection process for a particular application.	4
	OR	
(a)	What are the 9 different methods of gripper actuations & how do you actuate a gripper, explain.	4
(b)	what are the materials that could be used for robot design.	5
(c)	Explain the gripper selection for a particular robotic application.	6
Q5(a)	What is purpose of robotic control and write a note on the software that could be used for controlling the robots.	5
(b)	List out the types of robot programming languages that could be used for programming the robots.	5
(c)	Write a note on job scenario for the robotic enthusiastic & what is the future prospects in career development in industrial robotic programming.	5
	OR	
(a)	What the major industrial applications of robots, explain them neatly.	6
(b)	what are the advantages & disadvantages of robots. Illustrate them.	5
(c)	Write a note on the entertainment (movies), defense, underwater & space applications of robots.	4